

Two New Species of Galapagan Turrid Gastropods

BY

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(Plates 28 and 29; 5 Text figures)

AMONG NUMEROUS MARINE MOLLUSKS kindly submitted by Mrs. Jacqueline DeRoy of Academy Bay, Isla Santa Cruz, the Galápagos Islands to the senior author for study are representatives of two new species of toxoglossate gastropods referable to the Turridae. The description of these interesting discoveries forms the basis of this report.

We take great pleasure in dedicating this paper to our colleagues, Dr. Leo G. Hertlein of the California Academy of Sciences and Dr. A. Myra Keen of Stanford University, both of whom have made numerous contributions to Malacology.

Hindsiclava HERTLEIN & STRONG, 1955

Hindsiclava HERTLEIN & STRONG, 1955, p. 227; type species: *Pleurotoma militaris* "HINDS" REEVE, 1843, by OD.

Turrigemma BERRY, 1958, p. 88, type species: *Turrigemma torquifer* BERRY, 1958, by SD (BERRY, 1964, 154). OLSSON (1964, p. 96) referred BERRY's *Turrigemma* to the synonymy of *Hindsiclava*.

Remarks: The genus *Hindsiclava* was proposed for shells possessing strong axial ribs and cords to give a reticulate sculpture to the surface and with a well-developed node of callus at the sutural edge of the anal sinus. This anal node is apparently a gerontic character that does not appear in specimens with immature outer lips or in juveniles.

The following nominal species from the Eastern Pacific

are apparently referable to this genus, in addition to the type species, *Pleurotoma militaris* REEVE, 1843.

1. *Turris* (*Surcula*) *resina* DALL, 1908, p. 264, Gulf of Panama, in 322 fathoms (U. S. Fish Commission Station 3345), based on a single, large incomplete specimen with an anal node; DALL, 1919, p. 16, plt. 2, fig. 4 (holotype). This taxon was placed in the synonymy of *Hindsiclava militaris* by OLSSON, 1964, p. 96.
2. *Turris* (*Surcula*) *dotella* DALL, 1908, p. 263, off Baja California, Mexico, 27 fathoms, holotype (U. S. Fish Commission Station 2823) and 2 paratypes off La Paz, Baja California, Mexico; KEEN, 1958, p. 464, fig. 842 (holotype, U. S. N. M. No. 96731), an immature specimen lacking an anal node.
3. *Turris* (*Surcula*) *notilla* DALL, 1908, p. 263, off Cape San Lobos, Baja California, Mexico, in 58 fathoms, holotype (U. S. Fish Commission Station 3017), and 2 paratypes from same station. KEEN, 1958, p. 476, fig. 906 (holotype U. S. N. M. No. 110602), an immature specimen lacking an anal node, strongly resembling *Hindsiclava dotella* but with stronger axial sculpture.
4. *Clathrodrillia andromeda* DALL, 1919, p. 16, plt. 2, fig. 2, off La Paz, Baja California, Mexico, in 10 fathoms; KEEN, 1958, p. 464, fig. 841 (copy of DALL's (1919) figure). The holotype is a small juvenile specimen, lacking an anal node.
5. *Turrigemma torquifer* BERRY, 1958, p. 88, off Puerto Refugio, Angel de la Guarda Island, Mexico, in 65 fathoms. KEEN, 1958, p. 465, fig. 845 (holotype in collection of Dr. S. S. Berry?). This nominal species appears to be a junior synonym of *Hindsiclava andromeda* (DALL, 1919); the figured specimen of BERRY's taxon apparently represents a mature specimen.
6. *Hindsiclava hertleini*, new species, described below, from the Galápagos Islands.

The genus *Hindsiclava* is apparently limited in fossil and present day distribution to the New World. In addition to the record of *Hindsiclava militaris* REEVE in the late Neogene of Ecuador (OLSSON, 1964), several nominal

species that appear to be referable to this genus are known from numerous deposits of Mio-Pliocene age in the Caribbean region. For example, "*Pleurotoma*" *consors* SOWERBY (1850, p. 50), originally described from the Miocene of the Dominican Republic, was stated by SOWERBY to be an analogue of REEVE's *militaris*. RUTSCH (1934, pp. 99 - 101, figs. 13 - 16) cited specimens of SOWERBY's species from the Neogene of Venezuela and he discussed representatives of the group of *Hindsiclava consors* (SOWERBY) then known from the East American region. He also pointed out the similarity of "*Drilla*" *alesidota* DALL (1889, p. 84) and "*Drilla*" *macilenta* DALL, (1889, p. 85, plt. 36, fig. 1), Recent species described from the Gulf of Mexico and off Barbados, to *Hindsiclava consors*.

Hindsiclava militaris REEVE, 1843, *ex* HINDS MS

(Plate 28, Figures 1 to 4; Text figures 1, 2)

Pleurotoma militaris REEVE, 1843 [March], vol. 1, *Pleurotoma*, sp. 55, plt. 7, fig. 55, "Veragua, Central America" [Panama], 18 fathoms, mud, Hinds [type locality].

Clavatula militaris HINDS, 1843 [July], p. 38, Veragua [Panama], 18 fathoms, Panama, 8 - 30 fathoms. HINDS, 1844, p. 16, plt. 5, fig. 10, Veragua, Central America [Panama], in 18 fathoms; Panama, in 8 - 30 fathoms.

Drillia militaris "HINDS", TRYON, 1884, vol. 6, p. 181, plt. 10, fig. 74 (copy of REEVE's (1843) figure).

Pleurotoma (Drillia) militaris REEVE, WEINKAUFF, 1887, vol. 4, div. 3, p. 132, plt. 29, fig. 10.

[?] *Turris (Surcula) resina* DALL, 1908, p. 264, Gulf of Panama, in 322 fathoms, mud, U. S. Fish Commission "Albatross" station 3354, 7°09'45" N, 80°50'00" W [type locality].

[?] ?*Clathrodrillia resina* DALL, DALL, 1919, p. 16, plt. 2, fig. 4 (holotype; U. S. N. M. No. 123103); PILSBRY & OLSSON, 1941, p. 18, plt. 2, fig. 1, Punta Blanca, Ecuador, Canoa formation, Pliocene.

Hindsiclava militaris "HINDS", HERTLEIN & STRONG, 1955, p. 227, [in part, excluding reference to *Clathrodrillia aenone* DALL, 1919], Pinas Bay, Panama, 14 - 33 meters; Ardita Bay, Colombia, 34 - 43 meters; Octavia Bay, Colombia, 24 - 28 meters, in gray sand, sandy mud, and black bottom. OLSSON, 1964, p. 97, plt. 17, figs. 3, 3a, Quebrada Camerones, Ecuador, Esmeraldas formation, late Miocene-early Pliocene. KEEN, 1958, p. 465, figured on frontispiece.

Range: Off Magdalena Bay, Baja California, Mexico, through the Gulf of California, and south to Octavia Bay, Colombia (HERTLEIN & STRONG, 1955), off shore to 90 fathoms, ? 322 fathoms. Also reported as a fossil from late Neogene deposits of Ecuador (PILSBRY & OLSSON, 1941; OLSSON, 1964).

Radular characteristics: Radular formula 1·0·0·0·1. A racemose cluster of 30 - 40 "duplex" uncinat teeth

attached to an almost invisible, vestigial radular ribbon and seemingly enclosed in a membranous sac (Text figure 1). Each tooth consists of two articulating parts, a broad, blade-like member and a narrower, stylet-like member. The two parts articulate proximally and lie parallel for most of their length (Text figure 2). The radular arrange-



Figure 1

Figure 2

Hindsiclava militaris (REEVE, 1843)

Figure 1: Several radular teeth in their natural grouping.

Figure 2: Single tooth; both figures greatly enlarged.

ment in *Hindsiclava militaris*, the type species of *Hindsiclava*, suggests placement of this genus in the turrid subfamily Crassispirinae (see MORRISON, 1966).

Remarks: The type locality of *Hindsiclava militaris* is off Veragua, Panama, in 18 fathoms, based on specimens collected on the world-wide voyage of "H. M. S. *Sulphur*," under the command of Captain Belcher, in 1836 - 1842 (see HINDS, 1844, p. 16, plt. 5, fig. 10). HINDS' preliminary description of this taxon did not appear until October of 1843 (HINDS, 1843), whereas REEVE's description and figure of the taxon based on HIND's manuscript name appeared in March of 1843 (REEVE, 1843). Therefore, the authorship of this species must be credited to REEVE, 1843, on the basis of priority, as there is no evidence that HINDS provided the description that appeared in REEVE's (1843) monograph. It also should be noted that REEVE's description and those of HINDS (1843, 1844) are not identical. This fact further suggests that REEVE (1843) prepared his own description for this taxon.

KEEN (1966, p. 272) was unable to locate the type specimens of *Pleurotoma militaris* REEVE in the Belcher-Hinds collection of the British Museum (Natural History). Before undertaking the description of the new species of *Hindsiclava* that appears below, we inquired of the officials of the Mollusca Section of the British Museum

regarding the presence of potential type material of REEVE's taxon in their collection. They informed us that documented type specimens could not be located, but they kindly provided us with photographs of 3 specimens labeled "*Pleurotoma militaris* HINDS, Central America" from the Hugh Cuming Collection. Although these specimens do not now possess definite locality data, they may represent part of the original lot.

In the absence of better documented material, these specimens are candidates for syntypic status. They are worn specimens, the largest two being slightly smaller (measuring 39 mm and 36 mm, respectively, in length), than the specimen illustrated by REEVE (1843, pl. 7, fig. 55), which, judging from the figure, is 45 mm in length. The largest and best preserved specimen from the Cuming Collection is illustrated here, Plate 28, Figure 2, for comparison with a copy of REEVE's original illustration, here copied, Plate 28, Figure 1.¹

An examination of 12 lots of *Hindsiclava militaris* in the collection of the American Museum, totaling nearly 75 specimens, reveals that a well-developed anal node is present on only 5 of the larger specimens. The smallest specimen possessing a node measures 42.5 mm in length, whereas the largest with a node measures 45.6 mm in length. Similar-size specimens with immature outer lips lack a node (cf. Plate 28, Figures 3 and 4). Larger specimens attaining a maximum length of 50 mm, all of which appear to have immature outer lips, lack nodes. These data suggest that the presence of an anal node is a gerontic character of genetic significance that does not occur in juvenile individuals or in old specimens that have not developed a mature outer lip. It is possible, however, that the development of the node is the result of sexual dimorphism, or represents some other biological factor, but such conclusions must await further study.

We have questionably placed *Hindsiclava resina* (DALL, 1908) in the synonymy of REEVE's *H. militaris*. DALL's taxon was based on a single, incomplete specimen, that measures approximately 50 mm in length. This specimen possesses a partially developed anal node (DALL, 1919, pl. 2, fig. 4). It was stated to have been dredged in 322 fathoms in the Gulf of Panama. All live-collected specimens of *Hindsiclava militaris* that we have seen are from

stations on the continental shelf. Possibly this specimen was carried by turbidity currents or by some other means down the slope to this depth. OLSSON (1964, p. 96) placed *H. resina* in the synonymy of *H. militaris*, and he stated: "DALL's *Clathrodrillia resina* was described from a broken specimen (its length when perfect estimated at 88 mm.) dredged from a depth of 322 fathoms in the Bay of Panama." We have not seen specimens of *H. militaris* that approach this size. HERTLEIN & STRONG (1955, p. 227), however, cite "A very large specimen [of *H. militaris*] in the collections of the California Academy of Science from the southern portion of the Gulf of California: length, 56.4 mm.; maximum diameter, 1.7 mm."

DALL (1908, p. 264) also mentions with reference to the description of *Hindsiclava resina*: "A large shell very much broken and eroded with a somewhat similar form and sculpture . . ." was dredged from 134 fathoms, near Cocos Island. The incomplete specimen measures about 58 mm in length and "It has a large amorphous mass of callus on the proximal end of the pillar, . . . , and [this] may be a pathological feature."

This would appear to be a reference to a well-developed anal callus. DALL did not propose a name for the Cocos Island specimen because of the incompleteness of the shell.

Clathrodrillia aenone DALL (1919, pp. 15 - 16), which was not illustrated at the time the taxon was proposed, was referred to *Hindsiclava* by HERTLEIN & STRONG (1955, p. 227). The holotype of DALL's taxon was subsequently illustrated by KEEN (1958, p. 454, fig. 770), who retained it in *Clathrodrillia*.

Hindsiclava hertleini EMERSON & RADWIN, spec. nov.

(Plate 28, Figures 5, 6; Text figure 3)

Diagnosis: A medium-sized, slender species of *Hindsiclava*, characterized by numerous, coarsely nodulose, axial ribs (23 on body whorl of holotype), crossed by dark chestnut-brown lirations, over an off-white base. Aperture white, tinged with buff-yellow.

Description: Shell slender, spire acuminate, whorls shouldered; axial sculpture of slightly nodulose ribs, 20 to 23 on the body whorl; spiral sculpture of depressed lirae which decussate the axial ribs to form coarse nodules; body whorl with 7 major spirals of equal size and 1 minor spiral just below the suture, with 5 minor spirals at the base of the siphonal canal; spire consists of 3½ smooth nuclear whorls, and 8 sculptured, postnuclear whorls, which become progressively more strongly ornamented posteriorly; a narrow, weakly nodulose sutural collar is present above the suture on the spire, followed by 2 major nodulose axials, each divided by a narrow depressed

¹ According to DANCE (1966, p. 213), "The British Museum (Natural History) purchased 277 shells from [G.B.] Sowerby [3rd of name], many of them described and figured in the Mollusca reports of the *Sulphur* and *Samarang* voyages." Therefore, it would appear that part of Hind's *Sulphur*-material was distributed by the Sowerbys who were shell dealers, and the present specimens might have been obtained by Hugh Cuming from this source, or they could have been given to Cuming by Belcher or Hinds (see KEEN, 1966).

lira; outer lip thin with a moderately developed anal notch, lacking an anal callus in the holotype and the paratypes (presumably because of the immaturity of the specimens). Exterior off-white, with spirals and sutures dark chestnut-brown; interior white with inner lip and parietal wall tinged bright buff-yellow. Periostracum thin, nearly transparent, pale straw color.

Radular characteristics: Radular formula $1 \cdot 0 \cdot 0 \cdot 0 \cdot 1$. A racemose cluster of approximately 30 "duplex" uncinal teeth attached to a somewhat vestigial radular ribbon and seemingly enclosed in a membranous sac. Each tooth consists of two parts, a broad, blade-like member and a narrower, stylet-like member. The two parts articulate proximally and lie parallel for most of their length (Text figure 3). This type of radular dentition, typical of *Hindsiclava*, as shown earlier, suggests that this species and *H. militaris* should properly be assigned to the turrid subfamily Crassispirinae (see MORRISON, 1966).

Measurements: holotype 36.5 mm in length, 11.6 mm in width; largest paratype 31.7 mm in length, 9.1 mm in width (incomplete specimen).



Figure 3

Hindsiclava hertleini EMERSON & RADWIN, spec. nov.
Single radular tooth; greatly enlarged.

Type locality: South of Isla Daphne, Galápagos Islands, in 101 meters. J. DeRoy, November 25, 1967 (holotype, see Plate 28, Figure 5; and 1 paratype).

Type depositories: holotype, A. M. N. H. No. 150514; 1 paratype A. M. N. H. No. 152603 (dead specimen), May 27, 1967, Plate 28, Figure 6); 1 paratype S. D. N. H. S. No. 50768, December 9, 1968; 1 paratype, A. D'Attilio Collection, December 9, 1968; all from off Santa Cruz Island, Galápagos Islands in 73 - 91 meters.

Remarks: The holotype is a fresh, apparently live-taken specimen, whereas one paratype is a dead-collected, bleached specimen lacking the early whorls of the spire and part of the outer lip. The two other paratypes are live-collected specimens. All specimens appear to have immature outer lips and lack an anal callus in this stage of development.

The new species resembles *Hindsiclava militaris* in general features but differs in the narrower, sutural collar, more angular shoulder, fewer spirals and coarser nodes on the body whorls, as pointed out by Dr. Hertlein (*in litt.*), who kindly examined two of the Galapagan specimens. The periostracum of *H. militaris* is a greenish-brown while that of the new species is a pale straw-yellow.

Lioglyphostoma variculosa (SOWERBY, 1834, p. 139; REEVE, 1843, plt. 22, fig. 194), described from off west Panama and reported also from Mazatlan, Mexico (KEEN, 1958, p. 464), appears to have similar ornamentation, but it has fewer axial ribs. We have not seen specimens referable to this taxon.

Mitrolumna BUCQUOY, DAUTZENBERG
& DOLLFUS, 1883

Mitrolumna BUCQUOY, DAUTZENBERG & DOLLFUS, 1883, p. 121; type species: *Mitra olivoidea* CANTRAINE, 1835, by OD. POWELL, 1966, p. 67 (synonymy and remarks).

Clinomitra BELLARDI, 1889, p. 152; type species: *Clinomitra rovasendae* BELLARDI, 1889, by M, a Miocene fossil.

Diptychomitra BELLARDI, 1889, p. 152; type species: *Diptychomitra eximia* BELLARDI, 1889, by SD (COSSMANN, 1899, p. 174), a Miocene fossil.

Explanation of Plate 28

Figures 1, 2a, 2b, 3a, 3b, 4a to 4c: *Hindsiclava militaris* REEVE, 1843, type species of *Hindsiclava* HERTLEIN & STRONG, 1955.

Figure 1: copy of illustration of HINDS, 1843, plt. 5, fig. 10; $\times 1.25$.

Figures 2a, 2b: probable syntypes, Hugh Cuming Collection, British Museum (photograph courtesy and © of British Museum (Natural History)); $\times 1.25$.

Figures 3a, 3b: 146 - 165 meters, Gorda Banks, Baja California, Mexico, Templeton Crocker Station 150-D-12; $\times 1.25$ (note well-developed anal node).

Figures 4a to 4c: 101 - 183 fathoms, Arena Bank, Baja California, Mexico, Templeton Crocker Station 136-D-17; $\times 1.25$ (note the lack of an anal node).

Figures 5a, 5b, 6a, 6b: *Hindsiclava hertleini* EMERSON & RADWIN, spec. nov. Figures 5a, 5b: Holotype, with periostracum; $\times 2$.

Figures 6a, 6b: Paratype, dead, worn specimen, lacking early whorls; $\times 2$.



Figure 1



Figure 2 a



Figure 2 b



Figure 3 a

Figure 3 b



Figure 4 a

Figure 4 b

Figure 4 c



Figure 5 a

Figure 5 b



Figure 6 a

Figure 6 b



Remarks: Originally established for species having shells intermediate in appearance between some species of *Mitra* and *Columbella*, this genus appears to be related closely to *Mitromorpha* CARPENTER, 1865 (not *Mitromorpha* A. ADAMS, 1865), type species: *Mitromorpha filosa* CARPENTER, 1865 [= *M. carpenteri* GLIBERT, 1954]. The major difference seems to be the presence of two well-formed median pillar plicae in *Mitrolumna*. The radular dentition suggests a close relationship between these two genera, cf. Text figures 4, 5 herein with the text figure 123 of POWELL (1966), a radular illustration of the type species of *Mitromorpha*.

Until the discovery of the new Galapagan species, the only living representative of the genus *Mitrolumna* known was the type species *M. olivoidea* CANTRAINE, 1835 from the Mediterranean and north Atlantic. In addition, the following Miocene species were assigned to *Mitrolumna* by POWELL (1966, p. 67): *canaliculata* BELLARDI, 1889; *clathrata* BELLARDI, 1889; *cancellata* PEYROT, 1938; *dollfusi* PEYROT, 1938; *filifera* BELLARDI, 1889; *michaudi* MICHELOTTI, 1847; and *rovasendae* BELLARDI, 1889. *Mitrolumna olivoidea* is also known from the European Pliocene and Pleistocene.

It should be noted in passing that the well-known specific name *filosa* CARPENTER in the genus *Mitromorpha* CARPENTER was validly replaced with *M. carpenteri* by GLIBERT (1954, p. 43) owing to the fact that GLIBERT had assigned a European Miocene species, *Columbella filosa* DUJARDIN (1837, p. 302), to the genus *Mitromorpha* (s. s.). Thus, CARPENTER's specific name *filosa* became a junior secondary homonym, and *Mitromorpha carpenteri* was proposed by GLIBERT as a replacement name for *M. filosa* CARPENTER, 1865, not *M. filosa* (DUJARDIN, 1837).

Mitrolumna olivoidea (CANTRAINE, 1835)

Mitra olivoidea CANTRAINE, 1835, p. 391, Mediterranean, Adriatic. TOMLIN & SHACKLEFORD, 1914, p. 245, São Thomé, Canary Islands, and Mediterranean.

Mitra columbellaria SCACCHI, 1836, p. 10, figs. 12, 13, Naples, Italy.

Mitra obsoleta PHILIPPI, 1836, (not "BROCCHI," GRATELOUP, 1834, p. 290), vol. I, p. 230, Sicily, Italy.

Columbella greci PHILIPPI, 1844, vol. II, p. 194, plt. 27, fig. 18, Sicily, Italy.

Mitra striarella CALCARA, 1841, p. 66, Sicily, Italy.

Mitra clandestina REEVE, 1845, vol. II, sp. 253, plt. 32, fig. 263, no locality.

Mitra columbellaris SCACCHI, PETIT, 1860, vol. 8, p. 258, "les côtes de la Provence," (France).

Mitrolumna olivoidea BUCQUOY, DAUTZENBERG & DOLLFUS, 1883, p. 121, plt. 15, figs. 33-35 ("type"), 36-39 ("var." [fictitious]), Roussillon, France; synonymy and remarks.

KNUDSEN, 1956, p. 525, plt. 2, fig. 7, off Cape Vert, Senegal. DAUTZENBERG, 1889, p. 31, plt. 2, figs. 6a, 6b, Azores.

Mitrolumna oliviformis CANTRAINE, LOCARD, 1892, p. 50, "Mediterranean."

Range: North Atlantic (Portugal, NOBRE, 1932, to Senegal, KNUDSEN, 1956) through the northern Mediterranean (France, BUCQUOY, DAUTZENBERG & DOLLFUS, 1883); also reported as a fossil from Pliocene and Pleistocene deposits of Europe.

Remarks: *Mitrolumna* has long been considered monotypic. Its type species, *M. olivoidea*, is now known to be the last survivor of the genus with several species in the Old World Miocene and Pliocene. The discovery of a Recent species in the Galápagos Islands referable to *Mitrolumna* so far remote from the only other surviving species seemingly presents zoogeographic incongruities. Assuming the correct generic assignment of the new Galapagan species, one can speculate that these surviving species are relict elements of a group that once enjoyed a much wider distribution. It may eventually be found to have a geological history similar to that of the related genus *Mitromorpha* CARPENTER. Representatives of that genus are recorded from the Pliocene and Pleistocene of California, Pliocene of Florida, and Miocene of Florida and France (POWELL, 1966), with 4 Recent species known from Californian and west Mexican waters (KEEN, 1937; COAN, 1962) and at least one species living in the western Atlantic (DALL, 1889).

The radular characters of the type species of *Mitrolumna* apparently have not been illustrated or described, and we have not been successful in our efforts to extract a radula from the very limited number of specimens that were available for study.

Mitrolumna keenae EMERSON & RADWIN, spec. nov.

(Plate 29, Figures 5, 6; Text figures 4, 5)

Diagnosis: Shell moderately large for the genus (attaining 18 mm in length), biconical; characterized by numerous spiral incised lines on a buff-colored shell, with chestnut-brown axial maculations between the spiral incised lines which do not cross them.

Description: Shell moderately slender, whorls unshouldered; spiral sculpture of numerous fine, incised lines; axial sculpture completely lacking; body whorl with 27-30 glyptae with interspaces varying in width. Immediately below the suture there are 3 strongly incised lines alternating with 3 grooves of typical strength forming a series of 3 pairs of fine crowded striae; immediately below the periphery of the body whorl is another series of 3 to 5

crowded striae; remainder of the body whorl with regular sculpture; spire consisting of $3\frac{1}{4}$ smooth, glassy, translucent-white nuclear whorls and 8 sculptured postnuclear whorls which become progressively more strongly sculptured posteriorly; outer lip thin with moderately developed anal notch, interior of outer lip with 14 short, weak lirations. Exterior off-white with short chestnut-brown maculations, darkest on the crowded subsutural interspaces; a faint brown tinge on the peripheral group of 3 - 5 crowded interspaces; maculations randomly arranged on the interspaces but do not transverse the spiral incised lines.

The present species has a typical toxoglossate dentition with a packet of 16 dart-like teeth, each about 10μ long (Text figures 4, 5) in a lateral pharyngeal pouch; the packet remains cohesive during radular extraction as a result of the presence of a series of filaments which con-

nect all the teeth together. A fragment of such a filament may be seen in Text figure 4. This type of radular dentition clearly shows the relationship of this species to others assigned to *Mitromorpha*, and other borsonine and mangeline species (see MORRISON, 1966; POWELL, 1966).

Measurements: holotype 16.8 mm in length, 6.5 mm in greatest diameter; smallest paratype (from type locality) 13.3 mm in length; largest paratype 17.0 mm in length.

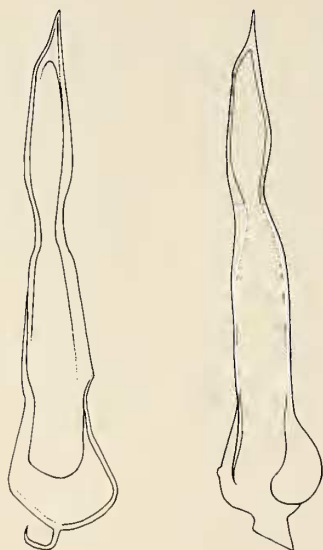
Type locality: near Tagus Cove, Isabella Island, Galápagos Islands, dredged in 75 - 100 meters, January 25, 1968, by the DeRoys.

Type depositories: holotype, A. M. N. H. No. 152601 (Plate 29, Figure 5); 1 paratype, A. M. N. H. No. 152602 (Plate 29, Figure 6); 1 paratype, S. D. N. H. S. No. 50769; 1 paratype, A. D'Attilio Collection; 1 paratype, J. DeRoy Collection. The paratypes are all from the type locality.

Remarks: All the specimens in the type lot were live-taken. The holotype and one paratype (in the J. DeRoy Collection) are fully mature, whereas the paratypes in the A. M. N. H., S. D. N. H. S. and the A. D'Attilio Collections are evidently immature.

The new species is generally similar to *Mitrolumna olivoidea* but differs from it in the following ways: 1) its shell is more than twice as large as that of *M. olivoidea*, 2) although both species have crowded spiral elements at the periphery of the body whorl, the spiral elements on spire whorls of *M. olivoidea* are strongly nodulose, whereas those of *M. keenae* have an almost planar surface, 3) the body whorl of *M. olivoidea* is broader than that of *M. keenae*, imparting a stouter appearance to the shell of the former, and 4) the two columellar plicae, typical of the genus, are more strongly developed in *M. olivoidea*.

Another genus that was given consideration for placement of this new species is *Arielia* SHASKY (1961, p. 20, plt. 4, figs. 7 - 9), type species *A. mitriformis*, by original designation. *Arielia*, however, typically has a much narrower shell, a more constricted body whorl, a much narrower aperture, and spire whorls with less convex profiles (Plate 29, Figure 1). Unfortunately, the radular characters of the type species of this eastern Pacific monotypic genus are not known.



Mitrolumna keenae EMERSON & RADWIN, spec. nov.

Figures 4 and 5: Two views of radular tooth; greatly enlarged.

Explanation of Plate 29

Figures 1a, 1b: *Arielia mitriformis* SHASKY, 1961, type species of *Arielia* SHASKY, 1961; 73 - 86 meters off Puerto Escondido, Baja California, Mexico, "Puritan" Station 139; $\times 3$ (note predator's drill hole, Figure 1b).

Figures 3a, 3b: holotype, mature specimen; $\times 3$ (note artificial "drill" hole, Figure 3b, drilled in order to remove soft parts for radular study).

Mitrolumna keenae EMERSON & RADWIN, spec. nov.

Figures 2a, 2b: juvenile specimen, paratype, with immature outer lip and lacking pillar plaits; $\times 3$.